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ABSTRACT

Designed to begin a feminist "unthinking" and rethinking of educational technology, this paper begins by examining some definitions of what that technology essentially is. Three characteristics of a feminist approach to science that can inform a rethinking of educational technology are then identified: (1) the theorizing of gender as a variable of consequence; (2) the valuing of women's experience as a scientific resource; and (3) the positioning of the researcher in the same critical plane as the researched. The discussion emphasizes issues that arise from an examination of educational technology in the context of three categories of technology users in schools: administrators, who impose educational technology on teachers; teachers, who impose educational technology on students; and students. It is argued that, since educational technology has been developed largely outside the domain of the teacher and without the benefit of her wisdom, the structures, standards, and schedule of the teacher's school day become out of her control, and research on the effectiveness of educational technology denies the importance of her work. It is also argued that educational technology as used by students is thoroughly saturated with the sex biases of its root disciplines and curricular contexts. It is concluded that the contributions of the teacher user and the female student user to the teaching-learning process are denied by the increasing use of educational technology, and a number of questions that might guide feminist rethinking of educational technology are suggested. (26 references) (BBM)

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# Title:

# Unthinking Educational Technology

## Author:

Suzanne K. Damarin

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# Unthinking Educational Technology

Suzanne K. Damarin
The Ohio State University

> *Feminist scholarship and feminist activism proceed not through a sterile, planar dialectic of thesis, analysis, synthesis, but through a dynamic process of unthinking, rethinking, energizing, and transforming. At its best, feminism creates new life forms out of experiences as common as seawater and insights as electrifying as lightening. (Bush, 1983, p. 152)*

The purpose of this paper is to begin a feminist unthinking-rethinking-energizing-transforming of the project (phenomenon, activitiy, effects, etc.) we call "educational technology." As Corlann Gee (Corky) Bush indicates in the statement above, the activity of unthinking requires that we resist the traditional, habitual, and for many of us almost automatic, tendency to begin an examination of "educational technology" (the thesis) by breaking it into constituent parts, "education" and "technology", analyzing these separately, and rationalizing their synthesis. An unthinking of Educational Technology requires that we unthink this procedure which is inherent, not only in our instructional design models, but also in many of our critiques (e.g., Nunan, 1983), and in those studies which attempt to relate specific technologies to educational goals. Every analysis based upon the independent listing and correlation of objectives with media and methods has the effects of reifying some set of educational goals or objectives and of validating some set of media, materials, and hardware or software technologies as the logical completion of the reified goals.

Such an analysis fragments the domain of discourse, changing its focus from educational technology *per se* to a set of concerns about the elements identified in the analysis. Many of these are relevant to the interests of women; for example, the question of whether computers are less appealing and effective for females than for males is of some importance to women seeking equal opportunities to learn specific content, but it begs the question of what we mean by "effective." Moreover, each analysis invites further analysis and further fragmentation; having identified a specific medium or category of materials, we can ask more specific questions: how is sexism replicated in that medium? how might the sexist elements identified be eliminated?

The point is that in this type of examination we are deeply engaged in **thinking educational technology**; at each step of the analytic procedure, the previous, more inclusive, construct is accepted and implicitly valorized. The higher order construct shapes the ways in which we think about its parts and the questions which we form. Therefore, if we wish to **unthink**

educational technology (and I do), we must resist the tendency to break it into parts. This "first unthinking" reveals that not only does educational technology (through ISD models) force upon us a fragmented view of the educational process and of the content or topics of education, but also the field tends to split itself apart for purposes both of research and of self-analysis. If we are to **unthink** educational technology we must struggle to deal with it as a coherent whole.

**A holistic view of educational technology**

The problem of describing what educational technology is has been addressed by AECT, resulting in a lengthy definition:

> **"Educational Technology" is a complex, integrated process involving people, procedures, ideas, devices, and organization for analyzing problems, and devising, implementing, evaluating, and managing solutions to these problems, involved in all aspects of human learning. In educational technology, the solutions to problems take the form of all "Learning Resources" that are designed and/or selected as Messages, People, Materials, Devices, Techniques, and Settings. The processes for analyzing problems and devising, implementing, and evaluating solutions are identified by the "Education-Development Functions" of Research-Theory, Design, Production, Evaluation, Selection, Logistics, and Utilization. The processes of directing or coordinating one or more of these functions are identified by the "Educational Management Functions" of Organization Management and Personnel Management.**
>
> ***Educational Technology: Definition and Glossary of Terms, 1977***

Implicit in this definition, although it is not explicitly recognized, is the idea of systems:

> **. . . systems can be defined as deliberately designed synthetic organisms, comprised of interrelated and interacting components which are employed to function in an integrated fashion to attain some predetermined purpose. Therefore, the best way to identify a system is to reveal its purpose. (Banathy, 1968, pp. 2-3)**

Taken together, these definitions confirm the essential character of educational technology as having to do, not with existing holistic phenomena, but rather with a multitude of ideas, agencies, procedures, and artifacts which are brought together and integrated to create "solutions to problems." Although the source and nature of the problems is unspecified, the means of dealing with them and of evaluating their solutions are listed (somewhat cryptically, using terms which are separately defined in the AECT glossary). The problems to be solved through educational technology must, then, be those problems which lend themselves to potential solution and solution assessment through integration of the listed mechanisms into "deliberately designed synthetic organisms." The AECT definition specifies no particular purpose for the systems created; the purpose must be assumed to arise

from the context in which educational technology exists, that is, from patriarchy. By its own definition, then Educational Technology is reminiscent of the new hammer in the hands of the young kid who suddenly sees everything as "needing hammering."

While the definition of educational technology specifies little about purpose, it provides a wealth of information about elements to be used in the design and development of applications of the tools and techniques of the technology. Beginning with the statement that Educational Technology is a process, the definition specifies the elements of the process, the forms of the problem solutions, and the assignment of tasks to the constituent parts or practitioners of the field. Analogously to the ways in which science is defined by "the scientific method(s)," educational technology is defined by its process(es). And, analogous to the claim of science to seek an understanding of our universe in all its aspects is the definitional claim of educational technology to deal with problems "involved in all aspects of human learning." Continuing with this analogy, feminist unthinking uncovers ways in which the feminist critique of science can inform a rethinking of educational technology.

Speaking from diverse feminist perspectives, a number of feminists have addressed the questions of whether there can be a feminist science and, if so, how it would be characterized. Among these thinkers/unthinkers, epistemologist Sandra Harding (1986, 1987) has not only critiqued malestream science from several perspectives, but has also identified three essential characteristics of a feminist approach to science: (1) the theorizing of gender as a variable of consequence, (2) the valuing of women's experience as a scientific resource, and (3) the positioning of the researcher in the same critical plane as the researched. Analogues to Harding's observations make visible three areas for feminist rethinking of educational technology. Attention of the field is directed by its definition to "all aspects of ***human*** learning" rather than toward learning by real live people who differ in ways (including gender) which are consequential. Moreover, **people** are among the Learning Resources that can be "designed and/or selected;" the specifically human, specifically gendered, and specifically personal is ignored if not suppressed in educational technology. Secondly, educational technology clearly ignores or rejects the experiences of women as the majority of teachers and as the fifty-or-so percent of learners who have experienced "human learning" in educational settings. (I shall return to these points later.) Thirdly, educational technology is clearly a "top-down" activity; the definition of the field indicates that the Learning Resources, Education- Development Functions, and Educational Management Functions which comprise the process of educational technology exist independently and apart from any specific learner or group of learners. In sum, the

feminist epistemological critique of science suggests several important avenues for the unthinking of educational technology.

The ecofeminist critique of malestream science brings feminist unthinking to science and technology, not from the perspective of epistemology, but from that of women concerned about the environment. Carolyn Merchant (1980), one of the "mothers" of ecofeminism frames her historical analysis of science and technology in the set of concerns common to environmentalists and feminists, stating "we must reexamine the formation of a world view and a science that, by reconceptualizing reality as a machine rather than a living organism, sanctioned the domination of both nature and woman (p. xvii)." Not only have ecofeminists continued to be engaged in the unthinking which Merchant began, but they are also engaged in rethinking and transforming science and technology. As Irene Diamond and Lee Quinby (1988) put it, "In place of current scientific theories and practices imbued with questionable notions of certainty, objectivity, and domination, ecofeminist discourse emphasizes indeterminacy, interconnectedness, and nurturance (p. 203)." Ecofeminist considerations invite us to consider whether educational technology perceives the reality of "all aspects of human learning" as more like a free-standing machine than a living social organism, and to unthink this perception. How are educational technology practices of "analyzing problems and devising, implementing, evaluating, and managing solutions" rooted in more general notions of certainty, objectivity, and domination? How do these practices sanction the domination of both nature and women (and men)? Can we rethink educational technology in ways that emphasize indeterminacy and the uncertainty of all "human learning," interconnectedness of (school) learning and lived experience, and nurturance of "the learner" as a real live gendered individual person?

Thus, feminist epistemologies and ecofeminism (together with other feminist theorizing) provide vocabularies, analogies, insights, and energy for the unthinking of educational technology as a process for the design and development of educational interventions, learner deficit models, negative reinforcement strategies, and other "Learning Resources" many of whose very names invite us to continue feminist unthinking of the definition and components of educational technology. Despite the importance of these issues, they do not encompass feminist concerns with regard to educational technology, for these issues all reside within the narrow view of educational technology as an isolated endeavor which might be improved, if not perfected, in and of itself. More important issues arise from the examination of educational technology in other contexts and from other perspectives. In the remainder of this paper I shall turn to one of these contexts, that of the user.

**Educational Technology and its Users.**

Feminist critiques of technologies have contributed substantially to the technological literature through their examination of the effects of innovations on the practices and the lives of technology users, particularly when those users are women. It is instructive to the unthinking of educational technology to consider an example of this work which has been especially effective in unthinking the media "hype" which promotes household technologies with promises of "less work for mother." Feminist unthinking of the notion that the automatic washing machine is purely and simply a boon to women has uncovered numerous effects on the lives of women in addition to the obvious fact that washing any given load of clothes is a lot easier than it was (Cowan, 1983). As a direct result of the new technology, the activity of washing clothes is no longer a scheduled activity restricted to a particular day, but takes place "as needed." Generally speaking, people have more clothes in need of washing and in need of special attention as they are laundered. Standards for laundering have changed, requiring "colors brighter and whites whiter than white." Clothes washing today is a solitary activity, rather than the peer group or mother-children activity it was in the past. Thus, the automatic washing machine has changed substantialy the daily lives of women, imposing new standards, schedules, and structures on them; at the same time, the "social credit" for laundering has been denied women by the notion that the automatic washer, not the woman who operates it, takes care of the wash.

Educational Technology invites and requires unthinking from the point of view of the user analogous to the unthinking that feminists have applied to household and office technologies. Such unthinking might begin with the examination of both the purported benefits of the technology for the user and the changes which the technology imposes on the users with respect to standards, schedules, social structures, and social credit . As we begin this examination, however, a prior question arises: Who are the primary users of educational technology? Several categories of users are apparent: school systems and their administrators, teachers, children in classrooms, independent students, military trainers, job applicants, trainees in business and industry, and a host of others who are engaged, in one way or another, in seeing to it that some (particular) "human learning" takes place. While recognizing that this diversity of users does affect the nature of the technology, I shall consider only the effects of educational technology on users in schools.

Within the context of schools there are three clearly separated categories of major users of educational technology: school administrators, teachers, and students. Administrators (superintendents, curriculum supervisors, principals) use educational technology as means of implementing local, state, and national educational policies, of standardizing

instruction and evaluation, of realizing certain measurable efficiencies, and of meeting parental and community demands that schools be "modern" and "effective." Teachers use educational technology partly as a result of administrative mandates and partly through the selection of instructional media and materials for particular goals and topics of the curriculum. Students are the "end users" of educational technology and use it most often as directed by teachers. Thus, school administrators (primarily male) impose educational technology on teachers (primarily female); in turn, teachers impose educational technology on students of both sexes. Although there is a need to unthink the idea that administrators are "free agents" in this hierarchy of use, I will focus on the teacher and student as users of educational technology.

Teachers as users of educational technology. A feminist unthinking of the effects of educational technology on teachers must begin with the observation that currently and historically the overwhelming majority of U.S. public school teachers of kindergarten through 12th grade are females. Indeed, school teaching has been closely identified with women since Catherine Beecher's 1846 identification of teaching as "woman's true profession;" until the current wave of feminism, the occupational choices available to women were three: secretary, nurse, and teacher. In this statistical and historical context, current criticism of school teachers, whether it come from the Holmes Group's (1986) arguments for reform of teacher education or from Heinich's (1988) arguments for replacing teachers with educational technology, must be viewed at least in part, as suppression of whatever unique qualities and values women currently bring to the activity of teaching. Exactly what qualities these are is not fully known, although nurturance and "the continuation of mothering" are among them (Grumet, 1988; O'Brien, 1989; Laird, 1988). Further feminist study is needed, for amidst the growing literature on feminist pedagogy at the post-secondary level (e.g., Bunch and Pollack, 1983; Culley and Portuges, 1985), there is a curious and serious shortage of feminist studies of teaching of the K-12 grades. Major exceptions are the books of Grumet (1988) and Weiler (1988), both of which highlight the importance of the individual teacher listening to the voices of individual students as she practices the art, not only the science, of teaching.

Like many other technologies, educational technology has been developed largely outside the domain of the user, in this case the teacher, and without the benefit of her wisdom as to how technological advance might help in the pursuit of her art. Instead, the products and processes of educational technology are delivered in fully developed form, sometimes with mandates for their use and sometimes simply as materials which might be useful. Although teachers and teacher magazines complain of it, I am unaware of studies of how this lack of communication effects the classroom

usability of these products. However, feminist studies of comparable practices in relation to office computerization clearly indicate that, had the women workers been consulted during the design of the specific systems they are required to use, the result would have been systems which were more appropriate both for the immediate user and for achieving the goals of the implementation (Suchman and Jordan, 1988; Zuboff, 1988). An unthinker needs to ask why teachers are not major actors in the specification, design, and development of educational technology. Is their exclusion simply an example of what Mary O'Brien (1989) sees as the continued exploitation of teachers by the establishment *because* they are women? Is it an extension of Barbara Garson's (1988) observation that "The underlying premise of modern automation is a profound distrust of thinking human beings" (p.261)? Or is it that the goals of educational technology are so discrete from the goals of teachers that the experiences of teachers are irrelevant to the design of educational technology?

If the design process of educational technology denies the value of the experiences of the teacher as an information resource, the implementation processes effect the structures, standards, and schedules by which she plans and performs her work. Computer managed instruction and competency based testing elevate the importance of some types of learning while limiting the teachers' choices and involvement within the instructional process; thus, they deny the value of any wisdom or insight she may have gained from her years of teaching. The possibilities for flexible planning of activities which are finished only when students reach some sort of closure on the topic are diminished by the need to use computer labs, broadcast television, or scarce hardware on an often fragmented schedule not of her making; chaos and the feeling that nothing is ever completed is introduced into the teachers' life. The inability to preview materials as students will experience them, either because of their prior unavailability or because complex branching precludes any examiniation of the full range of possibilities, renders the teacher less knowledgable with respect to students' actual experiences and at a loss for helping students who experience difficulty making connections or who encounter any sort of software failure.

In short, the structures, standards, and schedule of the teacher's school day become out of her control. The delivery of information, and the modelling of the use of this information, are increasingly removed from her; often the information provided to her students is not even readily available to her. Research on the effectiveness of educational technology denies the importance of her work, "meta-analyzing" her contributions out of the picture. As many writers on the future of schooling have observed, the teacher is increasingly a manager and facilitator. Her position becomes very much like that of the woman-as-laundress of our example. As schedules of instruction become more complex, as the standards for student acquisition of

"competencies" increase in number, and as expert systems, ICAI, interactive video, and other new technologies decrease the teacher's familiarity with the topics of instruction, apparently she will still be charged with the management of "human learning activities;" that is, she will be responsible for seeing that "human learning" takes place. Will she receive social credit for teaching when students learn? Or, will "educational technology" take care of that?

Students as users of educational technology. In thinking/unthinking about students as users of educational technology, I shall focus my attention on female students. However, a few general comments are important. The language of educational technology tends to deny the essence of the real live person who is the "end-user" of the technology. No longer a **student** (who studies), this person is positioned within educational technology as "the learner." (Taylor, 1987). The generic learner does not behave but exhibits behaviors, is not able but has capabilities, does not look at things but is presented with stimulus material, does not perform but meets criteria, and so on; in short, "the learner" is positioned as non-autonomous and passive by the language, attitude and rigors of educational technology. Similar positions are held by army recruits enduring the rigors of boot camp and by fraternity pledges undergoing hazing; it is a male position. Sally Hacker (1989), in her feminist examination of the commonalities of military training and engineering education, theorizes the importance of such positioning to the continuance and reproduction of patriarchy. Further unthinking which extends Hacker's work to an examination of school education and of educational technology is needed; however, in the meantime, we should not lose sight of the influence of the field of military training on the forms and functions of educational technology.

Beyond this positioning, educational technology reproduces patriarchy because it inherits and reproduces all the gender biases of its root fields and of the fields of "human learning" to which it is applied. Biases inherent in learning psychology, in the various technologies of media and materials, in educational measurement, and in the gendered subjects of school instruction interact multiplicatively as they are brought together in educational products for student users. A brief recap of some of these biases and their effects can inform our unthinking. Uncovering the ways in which the bodies of content of subject matter instruction are gendered has been the major project of the field of Women's Studies. Although the gender biases inherent in the canons of literature and the study of history have been examined most fully, the work of Sandra Harding (cited above) and of many other feminists who study science and/or philosophy has uncovered serious bias in the sciences; no field of study is immune to the presence of clearly gendered content, if not in the major concepts and underlying principles of the field, then in its illustrative examples, its canonized exemplars, or its applications.

The effects of gendered content upon female students can be numerous: the undervaluing of female potential, cognitive dissonance, and the confounding of cognitive and affective learning. Consider, for example, the plight of the pubertal young woman learning in biology class that females are "unfinished males."

The gendering of psychology merits special consideration because educational technology derives principles from psychological learning theory and implements practices based upon psychological measurement. The gendering of psychology is especially pernicious because one stated intent of the field is to study and understand sex differences. As early as 1903 (when psychology was still a very young field), the female psychologist Helen Thompson Woolley argued that the discipline was plagued with sex bias, especially in the area of sex differences research. Since that time, numerous scientists have expanded on Woolley's observations. Recent feminist writings on the topic include Corinne Squires' (1989) analysis which reveals that feminist psychologists have found psychology to be non- egalitarian at all levels. Not only are the researchers primarily male, and the subjects (who are the objects) of study historically male, but also the methods and theories are biased in gender specific ways. For example, the standard methods of psychological investigation vary with the (prior or presumed) gender correlates of a trait under study; characteristics which are considered to be male are studied using high status, active experimental methods, while those considered to be female are studied using lower status, passive methods such as questionnaires and observation. Thus at the level of investigation, methods and gender are confounded. Margrit Eichler (1988) has identified four primary problems of sexism which characterize psychological (and educational) research: androcentricity, overgeneralization, gender insensitivity, and double standards. As shown in her analysis, these problems manifest themselves in all stages of the research process, beginning with the choice of value laden topics for study and culminating in the sexist choice of interpretations and languages used in the reporting of results. Eichler observes that the use of the null hypothesis, and the labelling of results as "significant" only when the hypothesis is rejected, creates a literature of difference. As a consequence of this research practice, all "significant" results in the psychological study of gender must point away from samenesses of the sexes. As Allison Jaggar (1987) and other feminists have argued, the overall effect of sex differences research (and the publicity surrounding it) is to rationalize and reproduce inequality.

Procedures and practices of Educational Technology tend to play a considerable role in the reproduction of inequality. The educational research on which educational technology relies is saturated with studies of sex differences, so much so that when studies reveal no sex differences the researcher is almost obliged to follow up with some sort of ATI study which

will uncover a variable whose interaction with sex can "clarify" and "deepen" our understanding of how gender operates in relation to the original question. Such studies form the starting point for most research on instruction and the development of instructional procedures, and are also used in relation to research related to cognitive psychology and expert systems. After a difference in the measured performance of two groups is identified, representatives of the groups are studied in more detail with the object of determining characteristics which are present among the high performers and absent among the low performers. These characteristics are valorized through their naming and their designation as new instructional objectives. Instruction is then designed to help the low achievers reach these new objectives. The process is recursive in that it can be repeated with new objectives, thus dividing the instruction into smaller and smaller bites. Whenever the high achievers are predominantly male (as they are in math and science, especially) one effect of the process is to program females to behave like males. Another noteworthy effect of the procedure is that, because instruction is modelled on the spontaneous behavior of the achieving male, he is in no danger of losing his status as an achiever; if anything, his status is increased with the number of objectives that he can meet effortlessly. The implications for the female are entirely different; already caught in the recursive refinement of male objectives, her responses to a "learning situation" go unnoticed; they are neither categorized and named, nor reified as objectives. Whatever her reasons for so responding, and whatever the process of responding may have contributed to her personal learning (building her cognitive structure, if you will) remain hers alone, to be supplemented with the new "more appropriate" learning.

In summary, educational technology as used by students is thoroughly saturated with the biases of its root disciplines and curricular contexts. Gendered subject matter has different meanings for females than for males, and, therefore, is likely to elicit different responses and different strategies for dealing with it. When these differences result in measured differences in performance with respect to standards which are derived from the male definition of appropriate learning, the process of educational technology intervenes with products designed to instruct females on the details of male behavior in response to the topic. Initial interpretations and learning by females go unrecognized in the educational technology system (although they remain with the female). These gender biases and effects permeate all of education; however, by eliminating "noise" such as indeterminacy, ambiguity, and inefficiency from the instructional process, educational technology has the potential to perpetuate these biases in their purest form.

In diferent ways the contributions of the teacher user and the female student user to the teaching-learning process are denied by the increasing use of educational technology. For the teacher this denial takes the form of

simultaneously decreasing her authority with regard to the content of instruction, increasing the level of ambiguity in her day-to-day activity, and depriving her of social credit for the increasingly complex job which she performs. For the female student, denial is more subtle. Although the learning resources that she uses may be free of overt sexism, the deeply gendered characteristics of the learning environment and of her daily experience work together to deny her cognitive autonomy.

This unthinking of the effects of educational technology on its student and teacher users is but one beginning; a different unthinking or a further unthinking might bring to bear feminist research on women's ways of knowing (Belenkey et al, 1986) which posits a new and female-grounded stage theory of learning; it might spring from a feminist analysis of the the politics of education, or from a feminist deconstruction of educational equity. Additional contextual studies of educational technology should examine effects on other users, as well as the positioning and meaning of educational technology in social, cultural, historical, environmental, and other contexts. Analyses similar to the user analysis of this study should consider users from different races and classes within our society. In short, the paragraphs above comprise but one of the many ways in which it is both possible and essential for feminists to unthink educational technology.

**ReThinking, Energizing, Transforming**

Feminist unthinking, like post-modern deconstruction, shatters myths of value neutrality and frees us from the tyrrany of absolutism; it allows the rethinking and reconstruction of texts and technologies from new value bases. Feminist unthinking is not a form of Luddism, but begins with the premise that technologies are neither wholly good nor wholly bad. Technologies are products of the societies from which they emerge, and our society is patriarchal; it is no surprise, therefore, that feminist unthinking begins to unravel ways in which educational technology is deeply gendered and massively sexist. The question for feminist educators is whether unthinking its myths reveals educational technology to be so heavily valenced toward the masculine that it can have no place in a feminist society; or, on the other hand, does the unthinking suggest ways in which it can be rethought as a more feminist technology.

The unthinking of the previous pages evokes several questions which might guide feminist rethinking of educational technology, among them the following: Can the monolithic hierarchical structure of "educational technology" be rethought as a group of diverse "technologies of education"? What technologies of education would teachers invent? And how would they use them? How can we re-invent a technology of education based upon some of the new feminist research on the psychology of women? How can the power and flexibility of the computer be used to make the experiences, writings, and products of women (as well as men) available to students as

valuable learning resources? How can multiple technologies be used in the education of students with multiple interpretations of texts, experiences, and reality? How can educational technology foster students' understanding of the interrelatedness of perceptions and phenomena, and of indeterminacy? What is the place of technology in a nurturing educational environment? How can technologies be used in ways that do not deny the realities and needs of the individuals using them? To take these questions seriously is to find energy and to begin to transform educational technology.

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